Development of an E-Commerce Web App System through Implementation of the MERN Stack

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Abstract: **The twenty-first century has seen significant development in every industry. E-commerce is one of them. It is rising consistently. Nowadays, online shopping is more popular than visiting a physical store. As everything becomes digital, the online sector is experiencing an explosion. E-commerce has made shopping easy and time-saving. People are constantly looking for time-saving strategies. As this trend continues, the majority of businesses will likely transition to the web. It is now necessary immediately. Our culture has adapted to e-commerce. There are an endless amount of things that fit our criteria. Numerous websites sell a variety of goods. A product within a given price range can be on our search list. This not only simplifies the process for buyers, but also gives them a variety of options. Additionally, sellers have the opportunity to sell a variety of goods that are not available in a physical store. The vendor is not accountable for physical stores or other facilities aside from that. Customers and sellers benefit from this arrangement. This suggests that e-commerce will experience rapid growth. This website is primarily made to promote regional cultural goods. Online shopping enables customers to find any cultural product with ease. For the creation of these kinds of web pages, we used the MERN stack. There are numerous features included. A website for e-commerce today has provided established businesses a lot more chances for easier client communication, expanding into new markets, e-commerce, improving profits and becoming more competitive in rural areas. There are few models for recommending website development approach for e-Commerce Success, The study proposes that national cultural characteristics have a direct impact on disposition to trust and that disposition to trust has a direct impact on aspects of trust-worthiness. Additionally, we investigate if and how inclination to trust mediates the relationship between national culture and an online store's ability to be trusted. This study offers valuable information that can help e-commerce businesses make strategic decisions and allocate their limited resources to create more appealing websites and boost their financial success.**

Index Terms: Web App Development, E-Commerce, Cultural Product, Development, MERN Stack

I. INTRODUCTION

Today, e-commerce can mean many different things to many people. E-commerce (electronic commerce) is the activity of electronically buying or selling of products on online services or over the Internet. E-commerce draws on technologies such
as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. E-commerce is in turn driven by the technological advances of the semi-conductor industry, and is the largest sector of the electronics industry. There have been numerous definitions and concepts for e-commerce that address various problems, uses, and model value chains.

Our Motto is to develop an enriched e commerce website in our country for promoting the local cultural products and that should be largely accepted by the local vender and the customers.

This web app provides an authenticated and authorized login for both customer and the local vender and the admin to guarantee confidentiality. We indicated before; we need to apply this model very cautiously in assessing e-Commerce success in rural areas because it is a difficult process and involves many complicated entities. Therefore, it is necessary to create a new practical model that unifies some of the elements that have been previously suggested in numerous research for determining the success of e-Commerce.

II. Features

The main features of our website are: an end user can perform free online registration. User can search a specific product on his/her interest. The user can order the product online the payment method he/she can choose cash on delivery, pay on delivery, upi, credit/debit card. The admin have right to add any product, update its price or delete any product. They can promote there product through advertisements. Both the users can update their personal information at any time. After logging the user can search any product, can purchase them, They can order whatever they want. Customer can enjoy the detail of every product. A computerised inventory system is also inherited by the website. Therefore, whenever a consumer purchases a product, it is automatically subtracted from the inventory system. If any product's number falls below five, an email should also be sent automatically to the admin and supplier. Additionally, if a product runs out of supply, no client will be able to purchase it.

III. LITERATURE SURVEY

In accordance with conducted literature survey of the exist-ing e-commerce system, functionalities and their technologies that has been already implemented. The objectives that facili-tate product ordering system website is user-friendly and ease of access.

There are Many Websites which are providing ecommerce services. Delivery of products to houses and it was done through various websites.After that many project have been proposed for e-commerce, to connect them to the people, but it has made machine verification and processes, so it is not that much safer. Most of them E-commerce platform are focusing on machine made product and artificial product. Use of those technologies may slow down your process. In this site, the verification of the seler has been done by the admin hence it is safer. It uses MERN, hence the process and loading of the site is faster.

IV. THE PLANNING PROCESS

Our aim was to create a user-friendly, professional-looking, and attractive online web application. So that people of all age groups would become its end users. Setting up milestones and breaking the work into smaller pieces was the first step in our job. The objectives would serve as a benchmark for the amount of work that had been successfully completed. The following steps made up the full planning process.

A. Defining Use Case Models

Writing use cases for a system is a great way to clarify and understand the needs of the system. An end user who has access to internet browsing registers on and login onto our website. The user can use the search feature to find products that he want to purchase. After finding specific product user can add that proudcts into shopping cart and finally he/she can purchases the item online and the soft-copy of bill is generated. Therefore, the following were found to be the main requirements from the specified use case model:

- Registration/Login page
- Search option
- Shopping cart
- Billing systems

B. Domain Modeling

We followed the same methodology as the majority of the Web applications follows, which is Object Oriented Programming. Therefore, we continued with the Object-Oriented evaluation. which puts an emphasis on identifying and describing the objects, or concepts, within the problem domain. For Example, a product is an application of an object.

C. Architectural Pattern

The Model-View-Controller (MVC) is an architectural pat-tern that separates an application into three basic components: the model, the view, and the controller. Each of these compo-nents are built to handle specific development aspects of an application. MVC is one of the most frequently used industry-standard web development framework to create scalable and extensible projects. We followed standard practices of "Model-View-Controller" pattern for developing our web application.

MERN isn't an MVC framework in the traditional sense, because it spans both the server and the browser. MVC can also be achieved by sticking to server-side templating in Node, and just sending the HTML to the browser and treating the browser as the View layer i.e. doing things the way things have always been done forever. Although, when React is combined with a javascript- backend, then it is MVC. React serves as the "V" in the MVC.

Mongoose models defines the data part. This is where we will store all of the crucial data our application need to function. Express and Node js does all the functional programming and will be used to write the business logic tier (controller). This tier represents the application server that will act as a bridge of communication for th client and database. This tier will serve the react components to the user's device and accept HTTP requests from the user and follow with the appropriate response.

React serves as the "V" in the MVC, Our client tier (View) will be written in JavaScript, HTML, and CSS using ReactJS as the library. This level of the architecture is what the user will interect with to acess the features of our application.
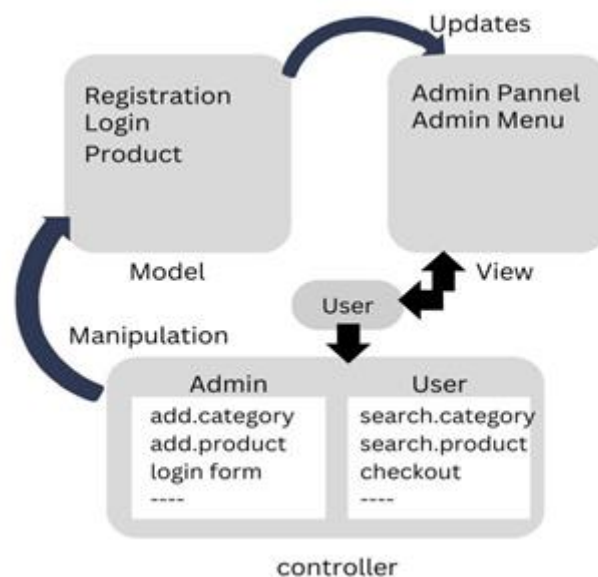

Fig. 1 Diagram of Model View and controller of the application

V. PROPOSED SYSTEM

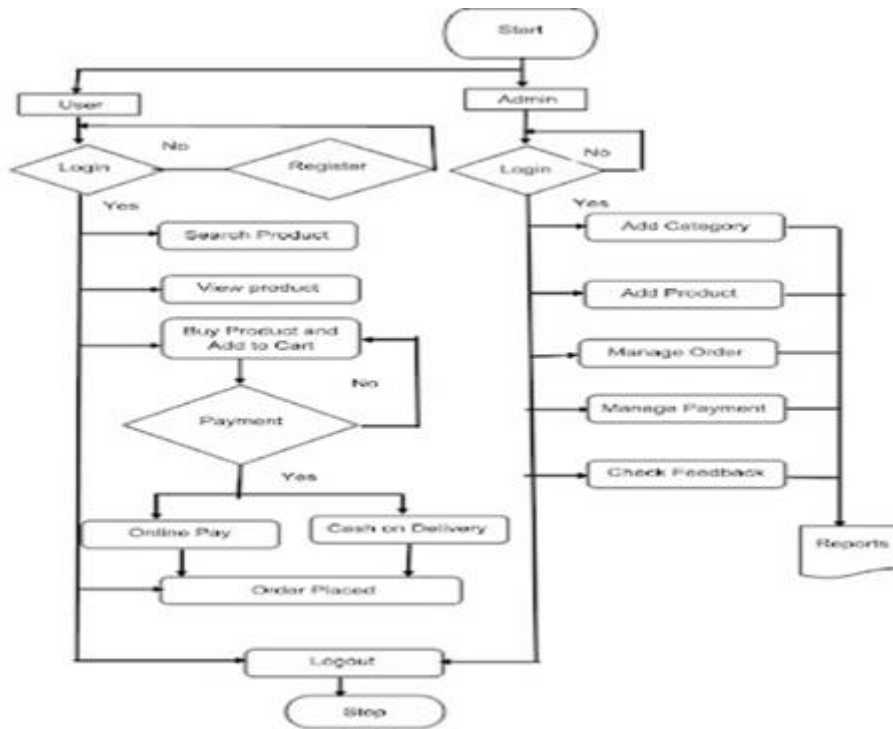Our proposed system is based on MERN Stack architecture. The following diagram shows flowchart of the Web App.

Fig.2 Workflow of website. Our proposed system following steps:

• Step 1. The login credentials entered by the users are cross checked and verified with the stored MongoDB database and after successful authentication, they are redirected to website's dashboard.

• Step 2. Assigned role detection There are different roles for users that are stored in the database and upon success-ful authentication, they are redirected to the dashboard according to their roles that are stored in the database as key-value pairs. They are as follows: i. Admin ii. Seller iii.User

– i. Admin Role: The Admin is the overall system admin who is responsible for data storage and verification and authentication. Number of admins will be differ as per requirements.

– ii. Seller/Local Vender Role: The seller/local venders are owners who have registered on our website to sell there hand made product through our portal. The need to sign up and submit their papers and credential on the sign-up form, and this will be verified by admins and authenticated them to use the back-end dashboard to manage their portal.

– iii. End User Role: This are the consumer who need to sign up and login on the our website. end users uses websites front-end and order their products form the portal.

• Step 3: Dynamic Dashboard Generation We have developed a proper management system on admin's dashboard, so that when the system admin logs in, he/she will be presented with multiple navigation options, this is similar to local vender's dashboard with different navigation options, but the portal is same.

• Step 4: Upon Successful authentication, the user can accessed portal according to there role. the local vender can access his online shop upon successful verification of their business by admin.

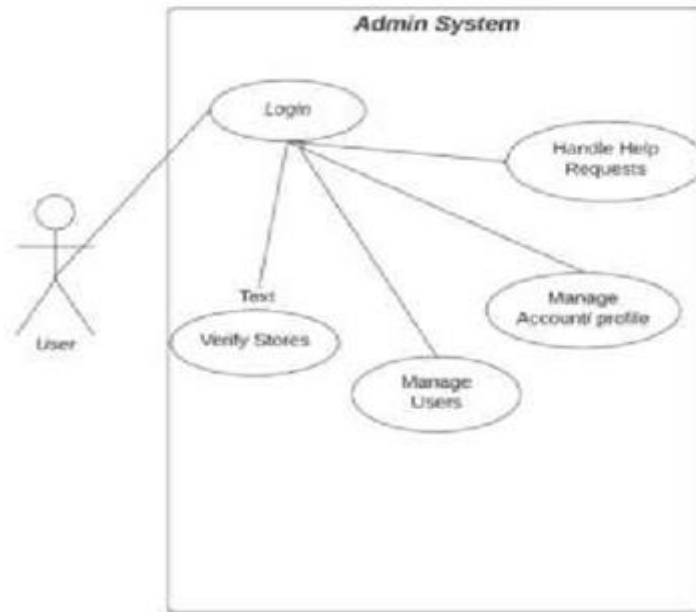There are different use case diagrams for different role:

A. Admin

Fig 3: Use case diagram of admin

The figure 4 use case diagram shows the following operations that an admin can perform, such as:

1:      Verify Shopes/Stores: Admin verifies the application of local venders with given login credentials and related documents such as Aadhar card and Pan Card. Admin authenticate the information and activate their account to allow them to use the portal to bring their shop online. 2. Manage Users: This feature allows the admin to make changes to local venders provided credentials and also delete and deactivate their account, if requires.

3. Manage Account/Profile: This feature allows the admin to manage its profile, reset the admin password. He/She can change the login credentials for themselves and update their stored data in database

4. Handle Help Requests: This feature allows the admin to read the queries raised from the Local Vender's side and provide solution the them accordingly.
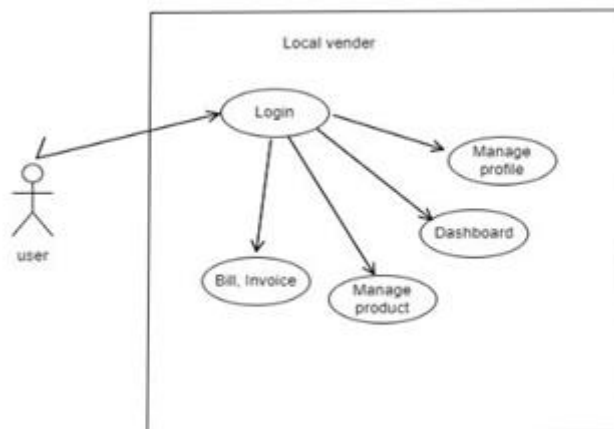
B. Local Vender

Fig 4: Use case diagram of local vender

The figure 5 use case diagram shows the following operations which can be done by the local venders such as:

1.   Bill, invoices, transaction history: This is Help to track all the bills and invoice which is generated from the previous completed orders. This displays to the local vender.

2.   Mange Product: This module helps the local vender to perform CRUD operation(Create, Read, Update, Delete) on the Listing of product, pricing, description and imagge.

3.   Manage Users: This module helps the local venders to manage their customer's database who ordered products from their shops. This will include numbers of order, subscription etc.

4.Dashboard: This dashboard shows the newly created orders, total revenue of local vender and history of sold items.

5.   Order Table: This is the module where all the place orders are displayed on the order page, This can be viewed via the dashboard also, along with name, address, time and date of the orders.
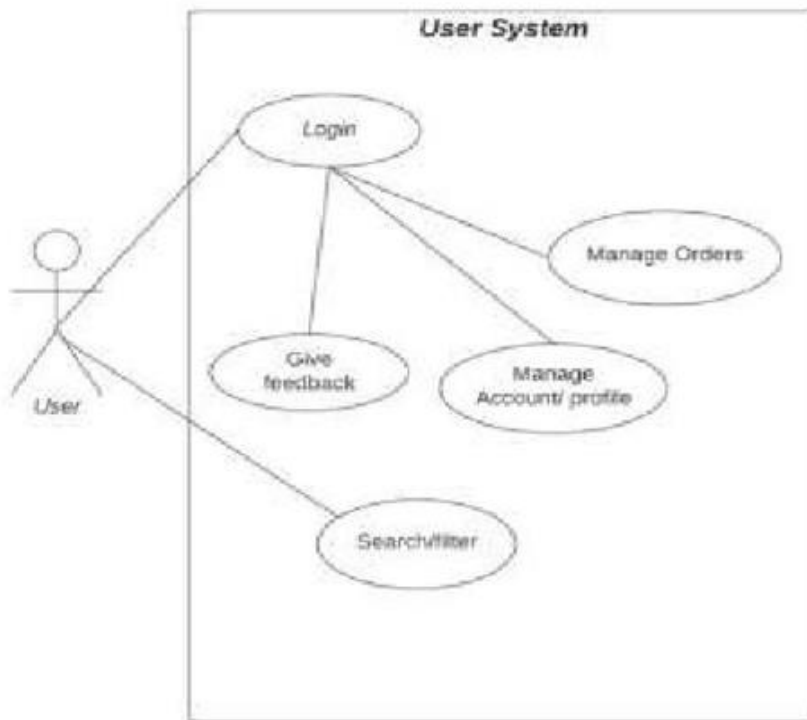
C. End user

Fig 5: Use case diagram of end user

The figure 5 use case diagram displays the operations which can be done by users such as:

1.   Manage Orders: This module allows the user to display the orders created by them and the amount paid by them for each of the item. The figure 6 use case diagram displays the operations which can be performed by users such as:

2.   Manage Account/Profile: This module allows the end user to manage it's own profile, He/She can reset the password, change the login credentials and update their information in the database.

3.   Give Feedback: This Module allows the user to provide feedback such as reviews ratings on the purchased orders. This feedback will be directly reflected on the website.

4.   Search/Filter; This module helps the user to filter the different products and search for a particular product on the website.

VI. BACKGROUND TOOLS

A. ReactJS
React is a free and open source front-end JavaScript library for building user interfaces based on UI components. It renders faster because it uses virtual DOM, hence reloading time is faster.

B. NodeJS
Nodejs is a cross-platform, open source server environ-ment that can run on Windows, Linux, Unix, MacOS, and more. Node.js is a back end JavaScript Engine, and executes JavaScript code outside a web browser.

C. ExpressJS
Express.js is a backend web application framework for building RESTful APIs with Node.js. it a free and open-source software under the MIT License. It is designed for building web application and APIs.

D. MongoDB
MongoDB is a source available cross platform document oriented database program. Classified as a NoSQL database program, MongoDB uses JSON like documents with optional schemas. MongoDB is developed by MongoDB Inc. It has a key value to access the data easier.

E. Mongoose
Mongoose is a JavaScipt object oriented programming li-brary that creates a connection between MongoDB and the NodeJs javascript runtime environment.

F. AXIOS
It is a javascript library to perform HTTP requests between both React and NodeJS.

G. JWT
JSON Web Token used for transmitting data securely and authentication.

H. React-Redux
It is used for global state management. To transfer the data to all UI components.

I. Node Mailer
It is used to send notification to the user and workers through mail.

J. Bcrypt
Bcrypt is a password-hashing function. It is based on Blowfish cipher.
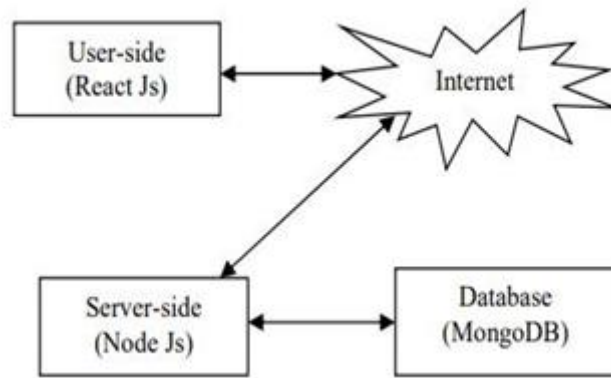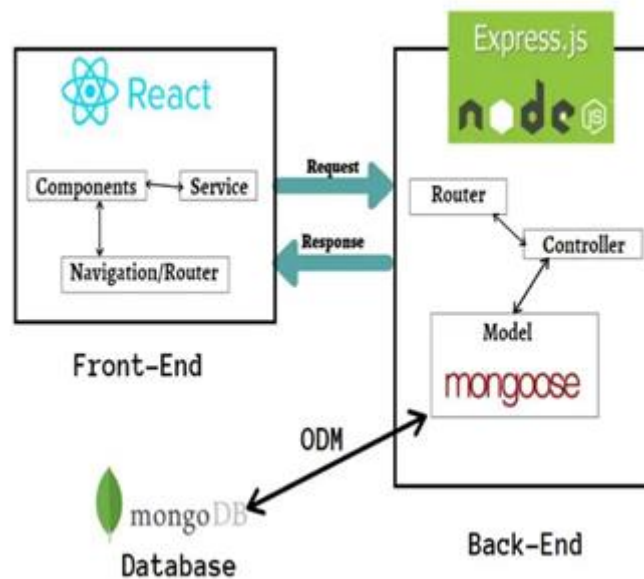
Fig. 6 Working of flow of the web app

Fig. 7 Mern Stack Architecture

Conclusion

Due to the fact that we no longer need to spend time and money travelling to the market, e-commerce has completely altered our way of life. With the aid of web development and e-commerce application development services, one can quicken the pace of his online business. It is one of the least expensive ways to do business because the growth of e-commerce has made it feasible to lower the cost of advertising goods and services. Selling the merchandise has no time restrictions. Even at one in the morning, one can access the internet and instantly sell goods.

ACKNOWLEDGMENT

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